Results Visualization Service

Plot, Animate and Analyze CAE Results over the Web

Administrator’s Guide
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Results Visualization Service 13.1 Administrator’s Guide

Updated: September 29, 2015

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Altair® PBS Works™ 13.0

Enabling On-Demand Computing™

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</thead>
<tbody>
<tr>
<td>Australia</td>
<td>+1 800 174 396</td>
<td><a href="mailto:pbs-support@india.altair.com">pbs-support@india.altair.com</a></td>
</tr>
<tr>
<td>China</td>
<td>+86 21 6117 1666</td>
<td><a href="mailto:es@altair.com.cn">es@altair.com.cn</a></td>
</tr>
<tr>
<td>France</td>
<td>+33 1 4133 0992</td>
<td><a href="mailto:pbssupport@europe.altair.com">pbssupport@europe.altair.com</a></td>
</tr>
<tr>
<td>Germany</td>
<td>+49 7031 6208 22</td>
<td><a href="mailto:pbssupport@europe.altair.com">pbssupport@europe.altair.com</a></td>
</tr>
<tr>
<td>India</td>
<td>+91 80 66 29 4500</td>
<td><a href="mailto:pbs-support@india.altair.com">pbs-support@india.altair.com</a></td>
</tr>
<tr>
<td></td>
<td>+1 800 425 0234 (Toll Free)</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>+39 800 905595</td>
<td><a href="mailto:pbssupport@europe.altair.com">pbssupport@europe.altair.com</a></td>
</tr>
<tr>
<td>Japan</td>
<td>+81 3 5396 2881</td>
<td><a href="mailto:pbs@altairjp.co.jp">pbs@altairjp.co.jp</a></td>
</tr>
<tr>
<td>Korea</td>
<td>+82 70 4050 9200</td>
<td><a href="mailto:support@altair.co.kr">support@altair.co.kr</a></td>
</tr>
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<td>Malaysia</td>
<td>+91 80 66 29 4500</td>
<td><a href="mailto:pbs-support@india.altair.com">pbs-support@india.altair.com</a></td>
</tr>
<tr>
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<tr>
<td>North America</td>
<td>+1 248 614 2425</td>
<td><a href="mailto:pbssupport@altair.com">pbssupport@altair.com</a></td>
</tr>
<tr>
<td>Russia</td>
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<td><a href="mailto:pbssupport@europe.altair.com">pbssupport@europe.altair.com</a></td>
</tr>
<tr>
<td>Scandinavia</td>
<td>+46 46 460 2828</td>
<td><a href="mailto:pbssupport@europe.altair.com">pbssupport@europe.altair.com</a></td>
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<td>Singapore</td>
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<td></td>
<td>+1 800 425 0234 (Toll Free)</td>
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<tr>
<td>South America</td>
<td>+55 11 3884 0414</td>
<td><a href="mailto:br_support@altair.com">br_support@altair.com</a></td>
</tr>
<tr>
<td>UK</td>
<td>+44 1926 468 600</td>
<td><a href="mailto:pbssupport@europe.altair.com">pbssupport@europe.altair.com</a></td>
</tr>
</tbody>
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1. Introduction to Results Visualization Service

Introduction

Results Visualization Service (RVS) provides features to access, process and visualize CAE results from anywhere, without installing any post-processing desktop applications through the user friendly web interface of Compute Manager and Simulation Manager. CAE analysts can monitor simulations in real-time by tracking and visualizing relevant parameters from solver log files. Meaningful plots and animations can also be created remotely without downloading huge raw results files from compute clusters or remote networks locations. A variety of FEA and MBD solvers are supported. Refer to the Supported Result File Types for further information.
The Altair HyperView Player plugin used by RVS is available at the download area of Compute Manager and PBS Works.

Overview of the Guide

This guide provides relevant information for the administrator in installing and configuring Results Visualization Service (RVS). The following topics are covered in the guide.

- Installation and Configuration of RVS
- Starting, Stopping and Restarting RVS
- Server Tuning Recommendations
- RVS Data Cleanup Criteria Settings
- Supported Result File Types
- Troubleshooting RVS
- Known Issues
- Licensing

Document Conventions

The following typographical conventions are used in this document.

Keyboard inputs you must enter are displayed as follows:

```
./etc/init.d/rgv start
```

Items you must select, such as command buttons, tab names, menu options, application fields, or items in a list are displayed in **Bold** as follows:

Choose the **Custom Install** option in the **Install Options** screen.

The location where an application is installed is indicated as `<Install Folder>`.

Information that supplements or emphasizes important points are displayed as follows:

| 📝 | The default TOC type for a result file is set in the plugin_def.xml file |
Tips that makes your work easier is displayed as follows:

If you get an error during registration of the HyperView Player, right click on the shortcut and choose the **Run as Administrator** option from the context menu.

Warnings are displayed as follows:

Restart the service before using the application.

The following acronyms are used in this guide.

**Table 1. Acronyms**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM</td>
<td>Compute Manager</td>
</tr>
<tr>
<td>HMath</td>
<td>HyperMath</td>
</tr>
<tr>
<td>HVP</td>
<td>HyperView Player</td>
</tr>
<tr>
<td>HvTrans</td>
<td>HyperviewTranslator</td>
</tr>
<tr>
<td>HW</td>
<td>HyperWorks</td>
</tr>
<tr>
<td>HWU</td>
<td>HyperWorks Unit</td>
</tr>
<tr>
<td>MOM</td>
<td>Machine Oriented Miniserver</td>
</tr>
<tr>
<td>PAS</td>
<td>PBS Application Service</td>
</tr>
<tr>
<td>PBS</td>
<td>Portable Batch System</td>
</tr>
<tr>
<td>RVS</td>
<td>Results Visualization Service</td>
</tr>
<tr>
<td>TOC</td>
<td>Table Of Contents</td>
</tr>
</tbody>
</table>
Introduction to Results Visualization Service
2. Installation and Configuration of RVS

This section describes the following:

- System Requirements
- The advantages and disadvantages of the four deployment options available for RVS
- Performance and scaling
- Installing RVS

System Requirements

Supported Server Platforms

- Architecture: Only the 64-bit (x86_64) platforms are supported

Supported Operating Systems

- Windows Server 2012 R2
- Red Hat Enterprise Linux version 6.X
- SUSE Linux Enterprise Server version 11.0 and later
- CentOS version 6.X and later

Supported Browsers

- Internet Explorer version 11 and later
- Mozilla Firefox ESR (Extended Support Release) version 38.0 and later
- Google Chrome: version 43.0 and later

Minimum System Requirements

- RAM: 16 GB
- CPU: A Quad Core Processor @ 2.5 GHz
- Disk Space: 10 GB temporary space for the installer

Recommended System Requirements

- RAM: 24 GB
- CPU: A Quad Core Processor @ 3.1 GHz
• Disk Space: 12 GB temporary space for Enterprise Foundation and Applications

RVS requires good network connectivity to all the connected file servers such as PAS server and job execution hosts. A minimum speed of 100mbps is required while a speed of 1gbps is recommended.

HyperWorks version 13.0.110 and later should be installed and available for many features of PBS Works applications and services. For Linux Virtual Machines, HyperWorks version 13.0.110 is required to parse supported CAD/CAE file types. For more details, refer to Configuring RVS for HyperWorks 13.0.110.

Selecting a RVS Deployment Option

The diagrams below depict deployment options for RVS with Compute Manager (CM) and PBS Professional Application Services (PAS).

Refer to Minimum System Requirements and Recommended System Requirements for more information to plan your deployment.
Deployment Option One

Advantages

- This deployment option provides better performance since there is no file copy required from PAS staging directory to RV Server.

Disadvantages

- High availability of computing resources on the PBS head node is required. High dependency since RVS performance affects PBS server.

Server - A: CM

Server - B: PAS, Altair HyperWorks and RVS
Deployment Option Two

Advantages

- In this deployment option, there is no file transfer from PAS staging directory to RV Server, therefore the performance is better.
- Costs are reduced since a single hardware is sufficient
- Maintenance cost is reduced since a single hardware is used.

Disadvantages

- Performance can be slow as all the services are running on a single machine.
- Adequate computing hardware resources are required.
- Not suitable for heavy usage load.
- High dependency on the single server's performance

**Server A**: Everything is installed in one machine.

To configure RVS and CM on the same machine, follow the steps below:

1. Install CM and start the service.
2. Install RVS.

The installer will detect if CM is installed in the same machine and assign a different port for RVS.
Deployment Option Three

Advantages

- This option provides better performance as the services are running on different machines.
- There is low dependency between RVS and other applications.

Disadvantages

- If the result files are not directly accessible, they are moved over the network resulting in slower response time. This can be improved by mounting PAS staging directory.
- High investment and maintenance costs.

Server - A: CM and PAS are installed.

Server - B: Altair HyperWorks and RVS are installed.
Deployment Option Four

Advantages
- Distributed environment reduces dependency.
- Better performance as the services are running on three different machines.

Disadvantages
- If the result files are not directly accessible, they are moved over the network resulting in slower response time. This can be improved by making PAS staging directory directly accessible to Server-C.
- High investment and maintenance costs

Server- A: PAS is installed.
Server- B: CM is installed.
Server- C: RVS and Altair HyperWorks are installed.
Performance and Scaling

Performance of RVS depends on many factors such as server hardware resources, typical file size, data composition and accessibility of result files from the server. Other key factors such as network bandwidth and speed, file server I/O performance and number of concurrent users also influence the overall performance of the system. Generally, performance of such systems are measured in terms of average response time offered by the system under typical loading condition, i.e. frequently used plot and animation requests for a certain number of concurrent users.

For reference purposes, the table below shows the average response time (sec) of a test system. The tests were performed using a typical data set distribution, for 10, 20 and 30 concurrent users and for different level of file accessibility ranging from locally accessible to network copy over 100 MB shared network connection.

<table>
<thead>
<tr>
<th>Category</th>
<th>Result Types</th>
<th>Sub Cases</th>
<th>Time Steps</th>
<th>Full TOC Size (MB)</th>
<th>File Size (GB)</th>
<th>Load Distribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>2</td>
<td>1</td>
<td>101</td>
<td>0.4</td>
<td>0.5</td>
<td>20</td>
</tr>
<tr>
<td>Medium</td>
<td>4</td>
<td>1</td>
<td>651</td>
<td>0.5</td>
<td>1.3</td>
<td>30</td>
</tr>
<tr>
<td>Large</td>
<td>2808</td>
<td>72</td>
<td>182</td>
<td>0.8</td>
<td>0.9</td>
<td>40</td>
</tr>
<tr>
<td>Very large</td>
<td>8505</td>
<td>81</td>
<td>3601</td>
<td>3.6</td>
<td>21</td>
<td>10</td>
</tr>
</tbody>
</table>

![Performance Test Results](image)
Please note that the values shown here are indicative and for reference purposes only. They do not guarantee a complete agreement and are not binding.

RVS scales linearly with the server hardware resources (CPU and RAM) up to a certain number of users but to serve more than fifty concurrent users, it is advisable to switch to a load balancing configuration. Load balancing configuration additionally provides some fail safe functionality, thereby minimizing the risk of service failure or request denial. For more information on this configuration and set up, please contact your Altair representative.

### Installing Results Visualization Service

This section describes the following:

- **Minimum Requirements**
- **Recommended Requirements**
- **Installation Media Download**
- **Installing Results Visualization Service**

#### Minimum Requirements

1. **Altair HyperWorks 13.0** or later must be installed
   a. The HyperWorks installation should not be in /root or any user's-home directory.
   b. It should be installed in a location where all users have read and write permissions.
   c. Refer to the HyperWorks installation guide for more details on how to install it.
   d. Installation of RVS must be performed as root or Administrator user

2. **If Compute Manager is already installed,**
   a. The **Server Name** is required to register the PAS with RVS.
   b. The **Server Name** should be specified in the "rm_servers.xml" file located at `<Compute-Manager_Product_Home>/services/rm/config/
   c. RVS url (http://<RVSHost>:Port) must be directly accessible from the connecting web clients.

#### Recommended Requirements

1. To avoid copying result files from job execution host to RVS, all execution hosts job scratch directories should be directly accessible from RVS. For more information, refer to the section **Making Job Directories Available to RVS.**
2. To avoid file copy, the file location should be directly accessible to RVS. PAS staging directory and job output directories (such as users home or project directories) should be mounted on RVS.

3. In some situations the above setup is not possible. Therefore, to use an efficient file copying system, password-less authentication must be configured among all hosts.

4. Compute Manager should be installed and configured after the RVS installation

   Refer to the Technical Advisory Notes section for:
   1. Setting permissions for users to access RVS in Windows.
   2. Setting up mapped drive locations on Windows when HyperWorks or Workspace is on a different location than RVS
   3. Setting up impersonation on Windows based installations.

Installation Media Download

RVS is available as an option in the PBS Works 13.0 installer.

Download the installer from the client center section of the Altair website.

Installing Results Visualization Service

Locate the PBS Works 13.0 Installer file.

On Windows: Right click on the file and select the Run as administrator option.

On Linux: Invoke the installer from the Administrator console.

The method of installation is identical in the Windows and Linux platforms.
The Installer will extract the files to prepare the installation and the welcome screen is displayed.
The **Introduction** screen provides information on navigating the installer using the **Next** and **Previous** buttons and specifies the **Pre-requisites for Installation**.

1. Minimum hard disk space of 4 GB.
2. Minimum RAM of 4 GB.
3. A username and password for the user who will be the PBS Works Administrator. This user should exist on the authentication server.
4. An existing username, if you choose Enterprise Datastore to query user details for authorization.
5. A non-admin username and password to be used as the owner of the PBS Works Database.
Scroll down and accept the **License Agreement** to proceed with the installation.
Choose the **Custom Install** option.
In the next screen, select the **Results Visualization Service** option.
Provide the Hostname or IP Address and Port of the Database used by PBS Works. RVS uses this database information for data persistence.
Choose the folder where you want RVS to be installed. We recommend you to install RVS in a separate machine. The default path in Windows is `C:\altair\pbsworks\13.0` and in Linux it is `/opt/altair/pbsworks/13.0`. 
Provide the HyperWorks license server details. RVS will use HyperWorks tools to generate plots and animations.

Enter multiple license server locations (if required) by using a semi colon ( ; ) to separate each location. In Linux, use colon ( : ) as the separator to specify multiple license server locations.
For installing RVS, provide the location of the HyperWorks Installation folder.
Provide the Hostname or IP Address of the PAS (PBS Application Services) Server.
The installer will display a summary of your choices. You can go back to make any changes if required. Check the details of the choices you have made and click **Install**.
On completion, the installer will display the **Installation Directory**, **Host** and **Port**.

---

**Console Installation**

The same steps described above can be executed from the console/command prompt for a console installation. To perform a console installation:

1. Open the console (command prompt) and type
   
   `<Installer_Name> -i console`

2. Follow the steps prompted in the console

---

**Configuring RVS for HyperWorks 13.0.110**

To use RVS with HyperWorks 13.0.110, perform the following steps after installation.

1. Navigate to the following location
   
   `<HyperWorks Install Folder>/altair/scripts/`

2. Verify on the availability of a soft link (symbolic link) for hmathserv

3. Navigate to the following location in the RV Server
<Install Folder>/rvs/config and open the site-config.xml file in a text editor.

4. In the site-config.xml file, the location for HyperWorks 13.0 should be specified properly.

Technical Advisory Notes

This section provides information on configuring RVS on Windows.

Setting Permissions for Users to Access RVS on Windows

If users do not have administrative privileges on the RVS server, then they have to be given full control permissions to the location where RVS data is available. Follow these steps for this configuration:

1. Check if the user who is requesting for results through RVS is existing on the RVS server. If the user does not exist, create an account for the user.
2. Check if the data directory exists in the RVS installation folder. Create this directory if it does not exist in the following location: <Install Folder>/rvs/data
3. Provide **Full Access Control** to the data directory for the users requesting for results through RVS.

Setting up Mapped Drives on Windows

On Windows, when HyperWorks or the workspace is on a different location than the RVS server, the drives need to be mapped and linked to RVS. Perform the following configurations to create the links for mapped locations.

1. Create the link for the mapped drive. e.g. `mklink /D C:\myLink \127.0.0.1\c$`
2. RVS users should be present on the shared system and the mapped system.
3. Provide the mapped or linked location in RVS
4. Restart RVS

Impersonation Checklist on Windows

The user who is running the RVS service should have these privileges for impersonation:

1. SeCreateTokenPrivilege
2. SeAssignPrimaryTokenPrivilege
3. SeServiceLogOnRight
4. SeTcbPrivilege
3. Starting, Stopping and Restarting RVS

Administrator privileges are required to start, stop and restart RVS.

Starting RVS

- At the Windows command line enter:
  `<Install Folder>/scripts/RVservice.bat start`
- At the Linux command prompt enter:
  `./etc/init.d/rvs start`

Checking the Status of RVS

- At the Windows command line enter
  `<Install Folder>/scripts/RVservice.bat status`
- At the Linux command prompt enter:
  `./etc/init.d/rvs status`

Stopping RVS

- At the Windows command line enter
  `<Install Folder>/scripts/RVservice.bat stop`
- At the Linux command prompt enter:
  `./etc/init.d/rvservices stop`

Restarting RVS

- At the Windows command line enter
  `<Install Folder>/scripts/RVservice.bat restart`
- At the Linux command prompt enter:
  `/etc/init.d/rvs restart`

To start and stop RVS from the service management console in Windows, use Results Visualization Service. On Linux, use the `rvs service`. 
4. Server Tuning Recommendations

This section describes the main parameters that can be modified in the RVS server and CM server for optimum performance.

Configurations on Results Visualization Server

The main configurations for improving RVS performance are provided in the table below. The important parameters, their default values and the location of the configuration file which contains the parameters is displayed below.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Default Values</th>
<th>File Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATALINA_OPTS (JVM Max)</td>
<td>512 MB (upto 30 concurrent users load)</td>
<td>On Windows: &lt;Install Folder&gt;/script/rvservices.bat</td>
</tr>
<tr>
<td></td>
<td>e.g. (-Xms512m -Xmx512m -XX:+UseConcMarkSweepGC -XX:+PrintGCDetails)</td>
<td>On Linux: &lt;Install Folder&gt;/scripts/server-start.sh</td>
</tr>
</tbody>
</table>

This parameter is used to start the server with a maximum memory heap size.
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Default Values</th>
<th>File Path</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOC size</strong></td>
<td>2097152 (In bytes)</td>
<td><code>&lt;Install Folder&gt;\rvs\config\site_config.xml</code></td>
</tr>
<tr>
<td>Specify the TOC max size limit in bytes. Helps to send the partial TOC (bytes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cache enabled</strong></td>
<td>True</td>
<td></td>
</tr>
<tr>
<td>Enable or disable data caching for RVS on the server</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Socket timeout</strong></td>
<td>6000</td>
<td></td>
</tr>
<tr>
<td>- is the maximum amount of time the server should wait for a response from another application before disconnecting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Connection timeout</strong></td>
<td>6000</td>
<td></td>
</tr>
<tr>
<td>- is the maximum amount of time the server should wait before closing an old connection and creating a new connection.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Socket timeout for HMath</strong></td>
<td>6000</td>
<td><code>&lt;Install Folder&gt;\rvs\plugins\hypermath_application\plugin_def.xml</code></td>
</tr>
<tr>
<td><strong>Connection timeout for HMath</strong></td>
<td>6000</td>
<td></td>
</tr>
<tr>
<td><strong>Socket timeout for PBS datasource</strong></td>
<td>6000</td>
<td><code>&lt;Install Folder&gt;\rvs\plugins\pbs_datasource_handler\plugin_def.xml</code></td>
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<tr>
<td><strong>Connection timeout for PBS datasource</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Idle timeout for PBS datasource</strong></td>
<td>21600</td>
<td></td>
</tr>
</tbody>
</table>
Configurations on Compute Manager

The table below provides the main parameters related to RVS in the CM server. The default value of the parameters and the location of the files in which these settings are stored are listed in the table.

<table>
<thead>
<tr>
<th>Parameter Description</th>
<th>Default Value</th>
<th>File path and Parameter Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum H3D file size supported in browser</td>
<td>26214400 (bytes)</td>
<td>&lt;CM Install Folder&gt;/services/rm/config/config.properties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(maxH3DFileSize=26214400)</td>
</tr>
<tr>
<td>Parameter Description</td>
<td>Default Value</td>
<td>File path and Parameter Examples</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Setting default log levels</td>
<td>INFO</td>
<td><code>&lt;CM Install Folder&gt;/services/rm/config/log4j.properties</code>&lt;br&gt;log4j.rootCategory=INFO, ActivityLogger.log4j.logger.ActivityLogger=INFO, activityLogAppender</td>
</tr>
</tbody>
</table>
| Registering RVS with Compute Manager  |               | `<CM Install Folder>/services/rm/config/rm_servers.xml`<br>`<RVSServerURL>`http://<ServerIP>:<Port>`</RVSServerURL>`<PAServers isConfigured="true">`<PAServers>`<Servername="PAServer01" rmServiceBaseURL="http://host:port" isPASStageMappedToRM="true or false" isPASScratchMappedToRM="true or false" />
|                                       |               | `/PAServers>`                    |

**Server Name:** Specifies the PAS server name registered with CM.

**rmServiceBaseURL** and **RVSServerURL**: Refers to RVS base URL.

**PAServers isConfigured**: Set this value to true.

**isPASStageMappedToRM**: Specifies whether the stage directory of the PAS is mapped to the RVS server.

**isPASScratchMappedToRM**: Specifies whether the scratch directories of all the PBS MOMs (execution hosts) are mapped to the RVS server.
Configurations on PAS Server (Optional)

The example below describes how to configure PAS application definition to copy pre-defined plot and animation templates to job execution directory when a job starts.

Let us assume that a predefined result template, Template1.rvst need to be copied to the job execution directory whenever an Optistruct job starts. The screenshot below shows the SolverOptistruct application definition directory structure.

Follow these steps to configure PAS application definition.

1. Stop PAS and copy the template files to "runtime" directory of application definition.
2. Edit the start.py file to include the copy statements as shown below:
   ```python
   import shutil
   shutil.copyfile("runtime/Template1.rvst", " Template1.rvst");
   ```
3. Start PAS.

   For information on how to start and stop PAS, please refer to the PAS User Guide or contact the PBS Administrator.

   Now, whenever a new job is submitted for the Optistruct solver, the template files will be automatically copied over to the job execution directory.

Configuring Solver Log File Readers

In order to plot Abaqus, Fluent and CFX log files, please follow the steps below.

These readers are already present in the standard installation of HyperWorks 13.0.110 but they are not activated by default. This section explains how to enable them.
Configuring Fluent log file reader

1. Open preferences_common_plot.mvw preference file from <HyperWorks Install Folder>/hw/prefinc folder.

2. Add *RegisterExternalReader({external_readers_dir + "/hgfluent.exe"}, "", "", ascii) just before the line: *RegisterExternalColumnReader({ external_readers_dir + "/ hgtextcolumn.exe"}) to register the reader.

Configuring Abaqus log file reader

1. Open preferences_common_plot.mvw preference file from <HyperWorks Install Folder>/hw/prefinc folder.

2. Add *RegisterExternalReader({external_readers_dir + "/hgabacussta.exe"}, "", "", ascii) just before the line: *RegisterExternalColumnReader({ external_readers_dir + "/ hgtextcolumn.exe"}) to register the reader.

Configuring CFX log file reader

1. Open preferences_common_plot.mvw preference file from <HyperWorks Install Folder>/hw/prefinc folder.

2. Add *RegisterExternalReader({external_readers_dir + "/hgfCFX.exe"}, "", "", ascii) just before the line: *RegisterExternalColumnReader({ external_readers_dir + "/ hgtextcolumn.exe"}) to register the reader.

Making Job Directories Available to RVS

For better performance and to avoid copying huge result files from job execution hosts to RVS, it is recommended that PBS Professional job sandboxes (i.e. see $jobdir attribute in the PBS Professional Administrator’s Guide) from all execution hosts are made directly accessible to RVS. If the file system hosting these job directories is not already mounted on RVS, it can be configured using NFS and automounter following the example given below.

As the proposed configuration has potential security implications with regards to file accessibility by unwanted parties, it is recommended that resulting file accessibility is tested against whatever security policy is applied for jobs submitted through CM and PBS Professional.

These instructions are valid only for Linux/Unix set up.

Let’s consider a scenario of two execution hosts node03 and node04.
On each execution host (MOM in PBS terminology), please do following steps.

1. Create a local (physical) directory `/scratch` on the host
2. Create a directory `/scr`
3. Edit the file `/etc/auto.pbs` to include all execution hosts as below.
   
   ```
   node04  -fstype=nfs  node04:/scratch
   node03  -fstype=nfs  node03:/scratch
   ```
   
   Above lines define mount names and destinations. This information will be used by automounter to create specific mount points.

4. Edit the file `/etc/auto.master` to include following line
   
   ```
   /scr/etc/auto.pbs --ghost
   ```
   
   This line specifies that automounter should create mount points for each directory specified in the `/etc/auto.pbs` file and add a prefix `/scr` to it.
   
   So in this case, two mount points will be created
   
   `/scr/node03` pointing to node03 `/scratch` directory and
   `/scr/node04` pointing to the node04 `/scratch` directory.

5. Edit the file `/etc/exports` to add below line for allowing other machines to be able to mount `/scratch` directory from this host.
   
   ```
   /scratch Subnet_IP/24 (rw,async,no_root_squash)
   ```

6. To apply the above changes to the system, please run the command
   
   ```
   exportfs -arv
   ```

7. Edit the MOM configuration file (`\var\spool\PBS\mom_priv\config`) to modify the `$job-dir_root` variable to point to the above created directory.
   
   ```
   e.g.  $jobdir_root /scr/node03
   ```

8. Reload the automounter to apply the changes
   
   ```
   /etc/init.d/autofs reload
   ```

9. Repeat above process for every execution host.

This can also be automated using a script.

On RVS, please do following steps.

1. Create a directory `/scr`
2. Edit the file `/etc/auto.pbs` to include all execution hosts as below
   
   ```
   node04  -fstype=nfs  node04:/scratch
   node03  -fstype=nfs  node03:/scratch
   ```
   
   Above lines define mount names and destinations.
   
   This information will be used by automounter to create specific mount points.
3. Edit the file `/etc/auto.master` to include following line
   `/scr/etc/auto.pbs  --ghost`

   This line specifies that automounter should create mount points for each directory specified in the `/etc/auto.pbs` file and add a prefix `/scr` to it.

   So in this case, there will be two mount points created
   `/scr/node03` pointing to node03 /scratch directory and
   `/scr/node04` pointing to the node04 /scratch directory.

4. Reload the automounter to apply the changes
   `/etc/init.d/autofs reload`

   **Most of these steps are already performed as part of PBS recommended set up. The only change specific for RVS is to edit the MOM configuration file for changing the `$jobdir_root` and configurations on RVS.**

If needed, these steps can be automated using a script.

These changes are required for efficient data handling while the job is still running, once the job is finished, all data is normally directly accessible either from PAS staging directory or the job output directory.

### Configuring RVS for SSL Mode

A secure connection between core RVS Server to RVS client, can be enabled using the `server.xml` file.

The location of the file for a typical installation of RVS is:

On Windows and Linux:

```
<INSTALL_DIR> \deploy\portal\services\rm\config\rm_servers.xml
```

To enable SSL service:

1. Add the following code with appropriate key store path and password in `server.xml` file.
   ```xml
   <Connector SSLEnabled="true" clientAuth="false" keyStoreFile<serverlocal-path>\rvskeystore" keyStorePass="**** maxThreads="150" port="8443" protocol="HTTP/1.1" scheme="https" secure="true" sslProtocol="TLS"/>
   ```

2. Restart the service in the core RVS Server to enable the secure communication between core RVS Server and RVS client.
5. RVS Data Cleanup Criteria Settings

This section describes the cleanup criteria settings for RVS data and it is configured using the site_config.xml file.

To configure site_config.xml file:

1. Edit cleanup criteria settings in the <rvshome>\config\site_config.xml file
   i. Enter the cleanup time in 24 hours format.
   ii. Edit the criteria to clean up result data with noOfDays from last accessed.
   iii. Edit cache clean up criteria with noOfDays from last modified.

   For example, use the following format to clean up the result data and cache.

   <CleanupTime>DAILY 01:00</CleanupTime>
   <CleanupCriteria>
     <Criterion id="LAST_ACCESS_TIME_BASED" noOfDays="30" class="com.altair.hwe.publish.resultsmanager.defaultimpl.LastAccessedTimeBasedCriterion"/>
     <Criterion id="FRAMEWORK_CACHE_CLEANUP_CRITERIA" noOfDays="100" class="com.altair.hwe.publish.resultsmanager.defaultimpl.LastModifiedTimeBasedCriterion"/>
   </CleanupCriteria>

2. Save the file & restart the RVS service.
6. Supported Result File Types

This section provides a table that describes the supported result file types in RVS.

<table>
<thead>
<tr>
<th>Results Files Format</th>
<th>Plot Data</th>
<th>Animation Data</th>
<th>Default TOC Type</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Animation</td>
</tr>
<tr>
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<td>Yes</td>
<td>Animation</td>
</tr>
<tr>
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<th>Animation Data</th>
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## Results Files Format

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<td>Plot Data</td>
<td>Animation Data</td>
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<td>Plot</td>
</tr>
</tbody>
</table>

The default TOC type (plot or animation) will be identified depending on the file type registration with RVS and the parameter `isDefault` in the `plugin_def.xml` file.

To set the Default TOC Type, change the value of `isDefault` to true in the RVS server configuration (`plugin_def.xml`). Any new file formats other than the ones mentioned in the table which are supported by HyperWorks can be configured in `plugin_def.xml`.

Supported Result File Types
7. Troubleshooting RVS

 Locating RVS log files

1. Check for the logs on the RVS server machine at the location:
   `<RVS Install Folder>/rvs/log/HWE_RM_Log.txt`
2. Check the web server Logs at the following location:
   `<RVS Install Folder>/thirdparty/apache/tomcat/log/catalina.out`
3. Check for the Compute Manager logs at the location:
   `<CM Install Folder>/log/awpf.log`
   `<CM Install Folder>/services/rm/logs/RMService.log`

RVS Troubleshooting Checklist

Here is a quick checklist of pre-requisites.

1. The RVS server should be installed on a supported Operating System. e.g. Windows 2012 R2, RHEL6.X, SLES 11.0 and later or CentOS 6.X and later.
2. A supported web browser should be used.
   e.g. Internet Explorer 11 and later, Firefox 38 ESR and later, or Google Chrome 43.0 and later.
3. On the RVS server **HyperWorks 13.0.110 or later** should be installed
4. On the client **HyperView Player 13.0.110 or later** should be installed and registered
5. The license server should be configured in the service startup file located at `<RVS Install Folder>/scripts/server-start.sh`
6. The user should have read access to results files
7. The user should have execute permissions in the RVS server
8. RVS is tested on the following combinations of component versions.

<table>
<thead>
<tr>
<th>CM</th>
<th>PAS</th>
<th>PBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1.0</td>
<td>11.1.0</td>
<td>11.3.0</td>
</tr>
<tr>
<td>11.1.0</td>
<td>11.1.0</td>
<td>12.0.0</td>
</tr>
<tr>
<td>11.1.0</td>
<td>11.3.0</td>
<td>12.0.0</td>
</tr>
</tbody>
</table>
9. The client, PAS, CM and RVS server should be accessible to each other.

10. The PAS, CM & RVS server’s host name & IP address should be registered to each other.

11. The PAS, CM & RVS server’s host name & IP address should be mapped to client machine. If you use hostname on one machine, use host name on all the others. If you use IP address on one machine, use IP address on all the others as well. Ping the machines to make sure they are all accessible to each other.

12. The server port should be unique for each of the servers and port clashes should not occur.

### Preparing Web Browsers for RVS

To prepare web browsers for Results Visualization follow the steps below.

**For all Web Browsers (Internet Explorer, Firefox and Chrome)**

1. Turn off pop-up blocker at least for the first instance
2. Disable any additional Java Script blocker plugins

**For Internet Explorer 11 and later.**

Set the following ActiveX control settings. In Internet Options choose Custom Level in Security settings. Choose the following:

1. Allow ActiveX filtering > Disable
2. Display video or animation on webpage that does not use external media player > Enable
3. Initialize and script active controls not marked as safe for scripting > Enable
4. Only allow approved domains to use ActiveX controls without prompt > Disable
5. Run active controls and plug-in > Enable
Configuring HyperView Player (HVP)


The supported HVP version needs to be installed. Register the HVP controls from program files as shown below.

If you get an error during registration, Right click the shortcut and choose **Run as Administrator** the context menu.

On successful registration, a message displayed as shown below.

If any other message is displayed, H3D files will not play in the browser.

To check the player installation, restart the browser. try animating a result file from the RVS UI or open an animation file from the Altair Demo directory (shown below) in the browser.
You should see the H3D files loading directly into html page without any errors (on IE, enable ActiveX control and other pop-ups) If all these methods fail, seek help from HyperWorks Support and inform the RVS team. To install HVP (without other HyperWorks modules), you download the installer from the Altair website.

Common Issues

Unable to start RVS or perform RVS operations.

Causes

1. Port Clash issue during server startup
2. HyperWorks license configuration issue.
3. Incorrect location of HyperWorks in configuration file

Resolution

1. Make sure that RVS server is restarted after installation configuration.
2. Check for any errors in the logs. Refer to the Locating RVS log files topic.
3. If it is a port clash issue, change the port numbers for SHUTDOWN and Connector in: <RVS Install Folder>/thirdparty/apache/tomcat/conf/server.xml
4. Start the services. Refer to the section Starting, Stopping and Restarting RVS.
5. Check the following URLs in browser for the service list http://<RVS-IP>:<RVS-Port>/ResultService/rest/doc
Restart the RVS Server after installation or configuration changes.

For resolving license related issues, check the license location for Hyperworks in the file `server-start.sh` at the location

```
<RVS Install Folder>/scripts/server-start.sh
```

The Altair HyperWorks installation folder location is stored in the file `site_config.xml` located at `<RVS Install Folder>/rvs/config/site_config.xml`. Edit this file to point to the HyperWorks directory.

### View Option is Unavailable in the Context Menu for Plot or Animation

**Causes**

1. Generic errors
2. RVS Server is not registered in CM
3. Result file format is unsupported
4. Web Browser is not configured properly

**Resolution**

1. Check if RVS is running. Check for any errors in the logs. Refer to the Locating RVS log files files topic. Perform the checks in the RVS Troubleshooting Checklist provided.
2. Verify that the RVS port number is not blocked through firewall settings.
3. Check for the RVS server entry in the CM server in the file

```
<CM Install Folder>/services/rm/config/rm_servers.xml
```

4. Restart the CM server after making any changes to the rm_servers.xml. Check for the name of the PAS server, it should be same as the name given during registering PAS and is case sensitive.
5. Check if the result file format is support by RVS. The default configuration is available at

```
<RVS Install Folder>/rvs/plugin/plot_toc_data_provider/plugin_def.xml
```

6. Follow the steps in the section Preparing Web Browsers for RVS to make sure that the required components are installed and configured.
Plot generation fails with Number format error

Cause
In some locales, in the numbering format for decimals and thousands, comma (,) is used as instead of dot (.).

Resolution
1. Check the system locale setting of the Compute Manager server
   ```bash
   [pbsadmin@hostname]$ echo $LANG
   ```
2. If the value of LANG is set to a different locale than English, set the locale in the CM server
   startup script located at:
   ```bash
   <CM Install Folder>/scripts/server-start.sh
   #####Setting locale#####
   set LANG
   export LANG en_US.UTF-8
   Or in JAVA_OPTS
   JAVA_OPTS="$JAVA_OPTS -Duser.country=US -Duser.language=en"
   After "+set server environment" in the file.

Unable extract TOC Error

Cause
The permissions to access the result file is restricted or not set properly.

Resolution
1. Check if the registered CM user has read permission on the result file.
2. If the registered user does not have read permission on the result file update the permissions of the registered user to read the result files.
HyperMath Execution Error: HW_APP_FAILED Message

Causes

1. HyperWorks is not updated with HW-130 patch for HMath.
2. HyperMath service is not running or does not have execute permissions

Resolution

1. Perform the checks listed in the RVS Troubleshooting Checklist.
2. Check for HMath patches available in the extras directory and apply them as instructed.
3. After applying patches check for the execute permissions of HMathserver
4. Check if the HMath service is started successfully
5. Check the wsdl location of the HMath URL hmath_wsdl_xxxx.wsdl
6. If it is a Fluent/CFX/Abaqus log file please check the logger is configured properly
## 8. Known Issues

This section provides a table that describes the known issues:

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Cause</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>For large TOC the browser displays the message &quot;Unresponsive script is running. Do you wish to continue?&quot;</td>
<td>This issue is noted when processing large data sets.</td>
<td>Please click Continue to view the TOC.</td>
</tr>
<tr>
<td>2</td>
<td>RVS-264: On Windows Server the result files in series cannot be viewed if the job directories are not directly accessible.</td>
<td>This is a known product issue.</td>
<td>The job directories have to be mapped to server.</td>
</tr>
<tr>
<td>3</td>
<td>RVS-323 &amp; RVS-325: The *.H3D output from MBD &amp; Flex and *.MAF are not supported for extracting animation.</td>
<td>This is a known product issue.</td>
<td>Not all file formats supported in HyperWorks desktop products are supported in Results Visualization Service.</td>
</tr>
<tr>
<td>4</td>
<td>RVS-330: HVP plug-in does not work on browser version for x86_64 architecture on Linux.</td>
<td>This is a known product issue.</td>
<td>Use a browser version of x86 architecture.</td>
</tr>
</tbody>
</table>
### Known Issues

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Cause</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>RVS-365: HVP (Hyper-View Player) browser plug-in does not display contour plot on Linux.</td>
<td>This is a known product issue</td>
<td>The contour for the animation result file can be viewed in HVP after downloading.</td>
</tr>
<tr>
<td>6</td>
<td>RVS-441: An extra component (Time) is displayed for some of the result files when they are plotted. This happens specifically for some of the Optistruct output files.</td>
<td>This is because of a difference in how Hyper-Graph and RVS display the information.</td>
<td>Please select the desired component for plotting and it should work as expected.</td>
</tr>
</tbody>
</table>
9. Licensing

Result Visualization Services use Altair patented licensing system of \textit{HyperWorks Units (HWU)}. Animation request will checkout 6 HWU and Plot request will checkout 10 HWU on the server. Units are leveled for the same user but stacked for different users. They are checked out only during the results extraction on the server. As soon as the results are extracted, units are immediately returned to the licensing pool. The client side rendering of plot and animation results are covered by Compute Manager licensing and does not require any extra units.